Climate, Weather and Water Science

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Overview

NOAA CONTEXT

Climate, Weather and Water Science

NOAA Core Science Function: **Discoveries and new knowledge of the oceans and atmosphere**, ranging from the causes and consequences of climate change and the physical dynamics of convective storms to the dynamics of complex ecosystems and the ability to model and predict future states;

OAR Strategic Plan

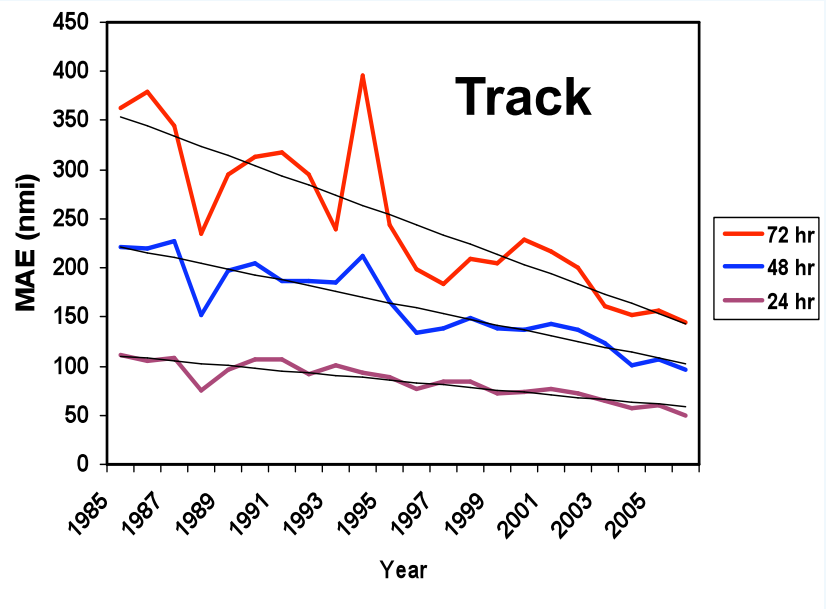
- Improve the **quality of climate observations, analyses, interpretation**…
- Conduct research and development in concert with the NOAA's operation and implementation programs to **infuse new science and technology**
- Engage in technological and scientific **exchange** with our domestic and international **partners**

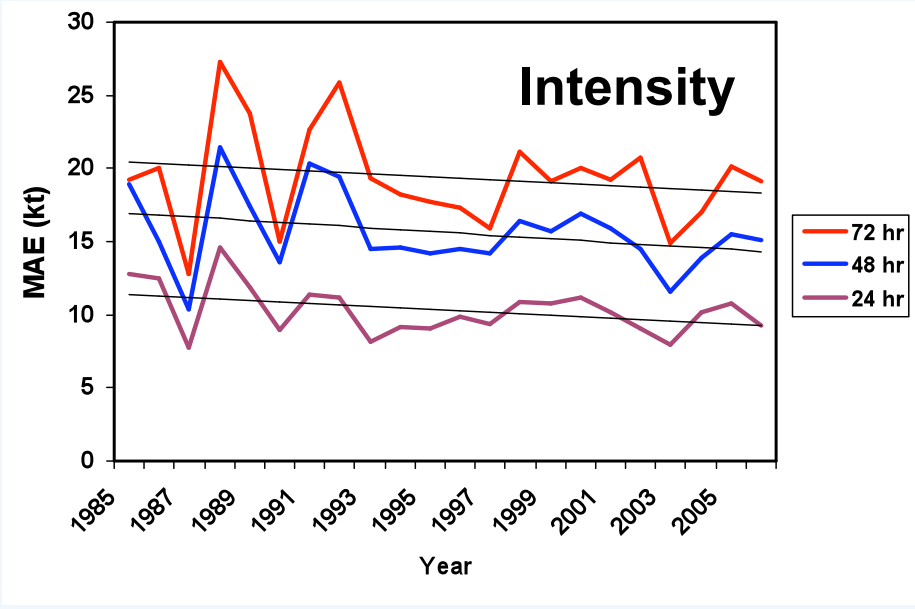
Mapping of Climate, Weather and Water Science onto PSD Strategic Goals

- *Goal 1: Conduct Research and Develop Prototypes to Improve NOAA Environmental Information and Services*
- *Goal 2: Integrate Climate, Weather, and Water Research*
- *Goal 3: Improve **Observations and Understanding** of Earth System Processes*
- *Goal 4: Understand, Attribute and Predict **Extremes** in a Variable and Changing Climate*
- *Goal 5: Advance Understanding of **Regional** Processes and Develop Applications Related to Climate Variability and Change*

Hurricane Intensity Forecast

Mean Absolute Error of the 1985-2006 National Hurricane Center Atlantic Intensity and Track Forecasts





48-hr track forecasts have improved 3.5% per year. **WHY?** Improvements in data quality, data volume, and data assimilation in **Globa**l model

48-hr intensity forecasts have only improved about 0.8% per year. **WHY?** Hypothesized that **Intensit**y dominated by small-scale structure (not observed) and processes (not handled correctly by models).

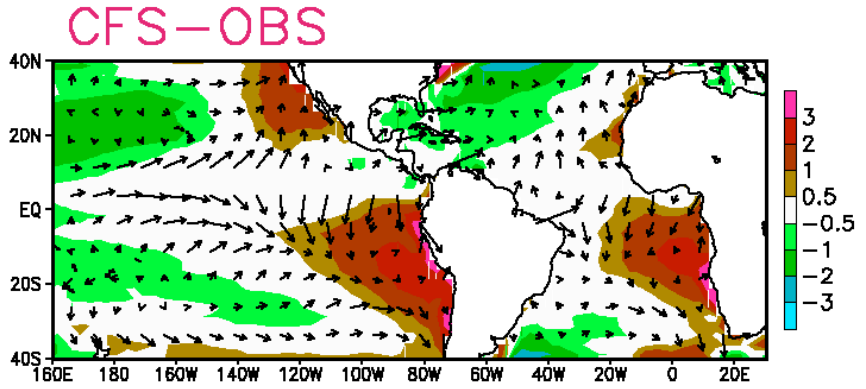
NOAA's Climate Forecast System (CFS): Model *Climatology* Compared with Observations

Warm SST bias in the CFS over the southeast Atlantic and southeast Pacific

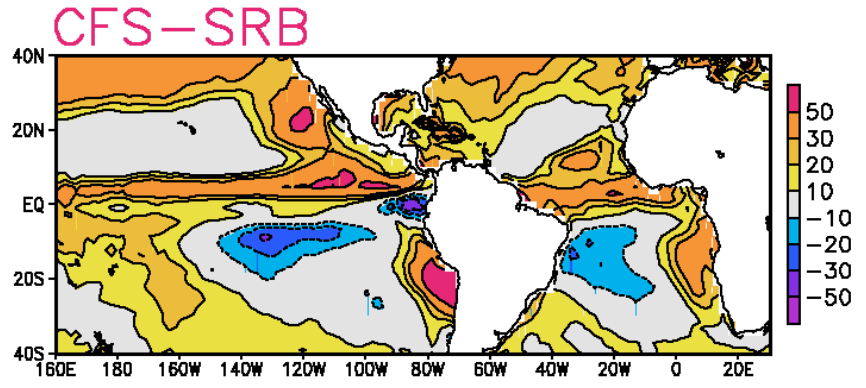
Too Much Surface Solar Radiation in the CFS over the southeast Atlantic and southeast Pacific

BUT, SST bias not always correlated with Solar Radiation bias

Implications of SST bias??
Stay Tuned



SST and Wind Errors



Downward Solar Flux Errors (?)

Surface Solar Flux Observing System

- Satellite Radiative flux products used to drive ocean circulation models; evaluate NWP and Climate models.
- Disagreements are substantial and worse at high latitudes.

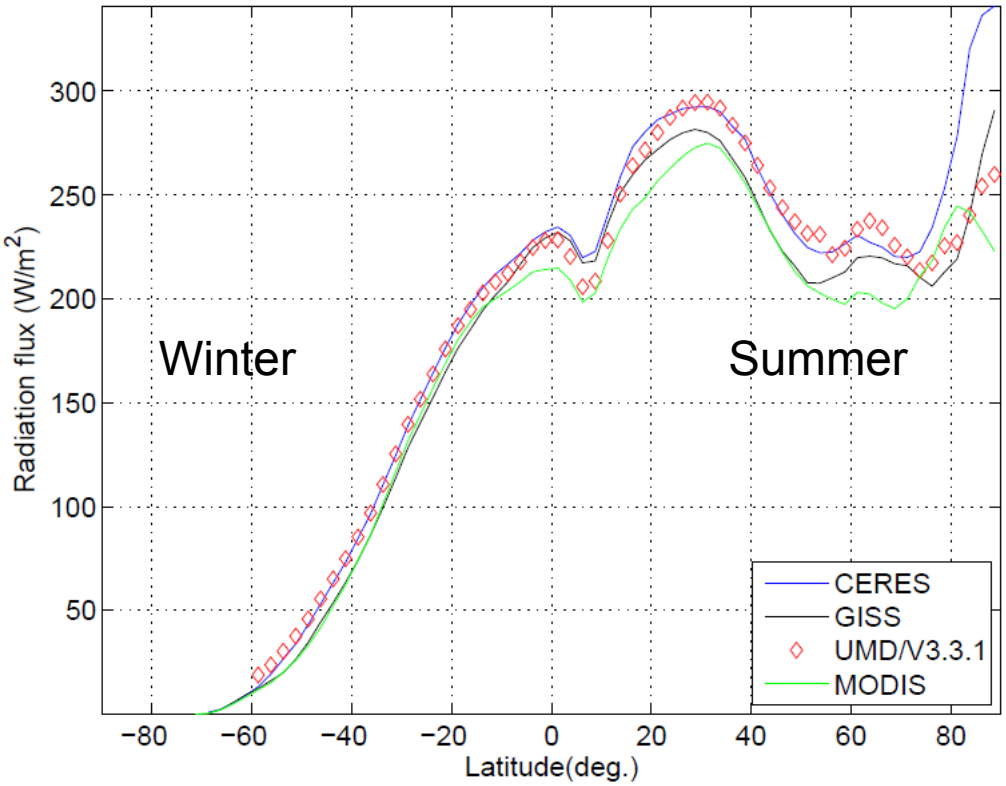
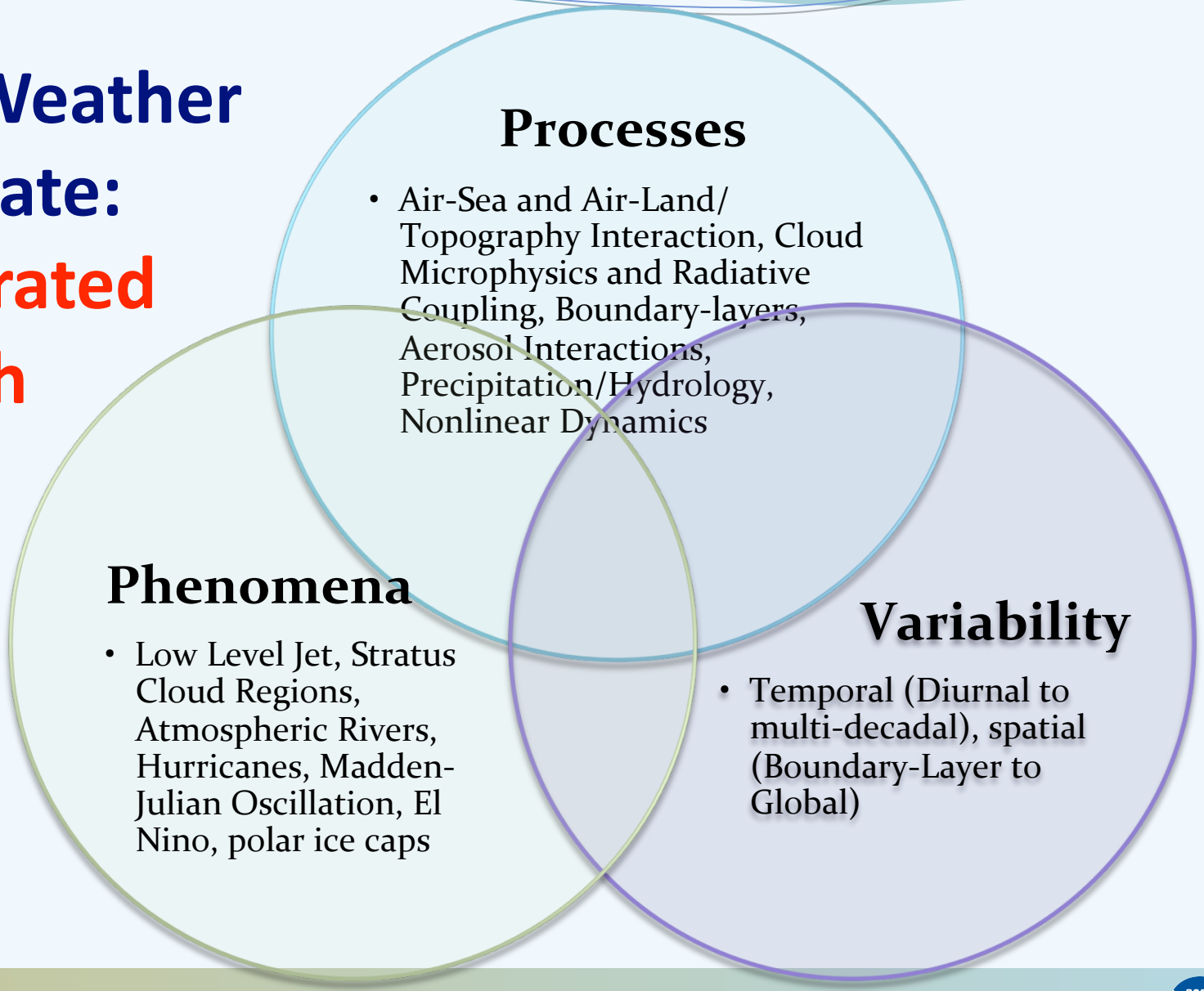


Figure 7. Comparison of the zonal mean downwelling shortwave flux (2004-2004) from four products: CERES (Rossow and Duenas 2004); GISS (Loeb et al. 2003; Gupta et al. 2004); UMD/V3.3.1 (Liu and Pinker 2008); and MODIS (Wang and Pinker, 2009). Note the relatively large disagreement in the northern hemisphere and particularly the arctic latitudes.

Comparison of 4 downward surface radiative flux *Satellite* products for NH summer

Linking Weather and Climate: An Integrated Approach



Theme 1 Roadmap

- Oral Presentations
  - Air-sea Fluxes (Processes) *Evaporate water*
  - Misrepresentation of Tropical SSTs in Climate Models (Variability) *SST drives evaporation and deep convection*
  - Diagnosing Time Scales of Atmospheric Moisture Transport (Process, Variability, Phenomena) *Global Transport of water vapor*
  - Atmospheric Rivers (Process and Phenomena) *Dumps water on the west coast*
  - Summary And The Way Forward
- Twelve Posters